



PHOE0188.ST25.txt  
SEQUENCE LISTING

<110> Clark, Mike A.  
<120> MODIFIED ARGININE DEIMINASE  
<130> PHOE-0188  
<140> US 10/757,843  
<141> 2004-01-15  
<150> US 09/723,546  
<151> 2000-11-28  
<150> US 09/023,809  
<151> 1998-02-13  
<150> US 60/046,200  
<151> 1997-05-12  
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35 40 45

Leu Glu Ser His Asp Ala Arg Lys Glu His Lys Gln Phe Val Ala Glu  
50 55 60

Leu Lys Ala Asn Asp Ile Asn Val Val Glu Leu Ile Asp Leu Val Ala  
65 70 75 80

Glu Thr Tyr Asp Leu Ala Ser Gln Glu Ala Lys Asp Lys Leu Ile Glu  
85 90 95

Glu Phe Leu Glu Asp Ser Glu Pro Val Leu Ser Glu Glu His Lys Val  
100 105 110

Val Val Arg Asn Phe Leu Lys Ala Lys Lys Thr Ser Arg Lys Leu Val  
115 120 125

Glu Ile Met Met Ala Gly Ile Thr Lys Tyr Asp Leu Gly Ile Glu Ala  
130 135 140

Asp His Glu Leu Ile Val Asp Pro Met Pro Asn Leu Tyr Phe Thr Arg  
Page 1

145 150 160  
Asp Pro Phe Ala Ser Val Gly Asn Gly Val Thr Ile His Tyr Met Arg  
165 170 175  
Tyr Lys Val Arg Gln Arg Glu Thr Leu Phe Ser Arg Phe Val Phe Ser  
180 185 190  
Asn His Pro Lys Leu Ile Asn Thr Pro Trp Tyr Tyr Asp Pro Ser Leu  
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Lys Leu Ser Ile Glu Gly Gly Asp Val Phe Ile Tyr Asn Asn Asp Thr  
210 215 220  
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225 230 235 240  
Leu Ala Lys Asn Ile Val Ala Asn Lys Glu Cys Glu Phe Lys Arg Ile  
245 250 255  
Val Ala Ile Asn Val Pro Lys Trp Thr Asn Leu Met His Leu Asp Thr  
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Trp Leu Thr Met Leu Asp Lys Asp Lys Phe Leu Tyr Ser Pro Ile Ala  
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Asn Asp Val Phe Lys Phe Trp Asp Tyr Asp Leu Val Asn Gly Gly Ala  
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Ser Ile Ile Asn Lys Lys Pro Val Leu Ile Pro Ile Ala Gly Glu Gly  
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Ala Ser Gln Met Glu Ile Glu Arg Glu Thr His Phe Asp Gly Thr Asn  
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Tyr Leu Ala Ile Arg Pro Gly Val Val Ile Gly Tyr Ser Arg Asn Glu  
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Lys Thr Asn Ala Ala Leu Glu Ala Ala Gly Ile Lys Val Leu Pro Phe  
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 Glu Phe Leu Glu Asp Ser Glu Pro Val Leu Ser Glu Ala His Lys Lys  
 100 105 110  
 Val Val Arg Asn Phe Leu Lys Ala Lys Lys Thr Ser Arg Lys Leu Val  
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 Glu Leu Met Met Ala Gly Ile Thr Lys Tyr Asp Leu Gly Val Glu Ala  
 130 135 140  
 Asp His Glu Leu Ile Val Asp Pro Met Pro Asn Leu Tyr Phe Thr Arg  
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 Tyr Lys Val Arg Arg Arg Glu Thr Leu Phe Ser Arg Phe Val Phe Arg  
 180 185 190  
 Asn His Pro Lys Leu Val Asn Thr Pro Trp Tyr Tyr Asp Pro Ala Met  
 195 200 205  
 Lys Leu Ser Ile Glu Gly Gly Asp Val Phe Ile Tyr Asn Asn Asp Thr  
 210 215 220  
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 225 230 235 240  
 Leu Ala Lys Asn Leu Val Ala Asn Lys Glu Cys Glu Phe Lys Arg Ile  
 245 250 255

Val Ala Ile Asn Val Pro Lys Trp Thr Asn Leu Met His Leu Asp Thr  
260 265 270

Trp Leu Thr Met Leu Asp Lys Asn Lys Phe Leu Tyr Ser Pro Ile Ala  
275 280 285

Asn Asp Val Phe Lys Phe Trp Asp Tyr Asp Leu Val Asn Gly Gly Ala  
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Glu Pro Gln Pro Val Glu Asn Gly Leu Pro Leu Glu Lys Leu Leu Gln  
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Ser Ile Ile Asn Lys Lys Pro Val Leu Ile Pro Ile Ala Gly Glu Gly  
325 330 335

Ala Ser Gln Met Glu Ile Glu Arg Glu Thr His Phe Asp Gly Thr Asn  
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Tyr Ile Ala Ile Arg Pro Gly Val Val Ile Gly Tyr Ser Arg Asn Glu  
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Lys Thr Asn Ala Ala Leu Lys Ala Ala Gly Ile Lys Val Leu Pro Phe  
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50 55 60

Met Lys Asp Arg Gly Ile Asn Val Val Glu Leu Thr Asp Leu Val Ala  
65 70 75 80

Glu Thr Tyr Asp Leu Ala Ser Lys Ala Ala Lys Glu Glu Phe Ile Glu  
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 Thr Phe Leu Glu Glu Thr Val Pro Val Leu Thr Glu Ala Asn Lys Lys  
 100 105 110  
 Ala Val Arg Ala Phe Leu Leu Ser Lys Pro Thr His Glu Met Val Glu  
 115 120 125  
 Phe Met Met Ser Gly Ile Thr Lys Tyr Glu Leu Gly Val Glu Ser Glu  
 130 135 140  
 Asn Glu Leu Ile Val Asp Pro Met Pro Asn Leu Tyr Phe Thr Arg Asp  
 145 150 155 160  
 Pro Phe Ala Ser Val Gly Asn Gly Val Thr Ile His Phe Met Arg Tyr  
 165 170 175  
 Ile Val Arg Arg Arg Glu Thr Leu Phe Ala Arg Phe Val Phe Arg Asn  
 180 185 190  
 His Pro Lys Leu Val Lys Thr Pro Trp Tyr Tyr Asp Pro Ala Met Lys  
 195 200 205  
 Met Pro Ile Glu Gly Gly Asp Val Phe Ile Tyr Asn Asn Glu Thr Leu  
 210 215 220  
 Val Val Gly Val Ser Glu Arg Thr Asp Leu Asp Thr Ile Thr Leu Leu  
 225 230 235 240  
 Ala Lys Asn Ile Lys Ala Asn Lys Glu Val Glu Phe Lys Arg Ile Val  
 245 250 255  
 Ala Ile Asn Val Pro Lys Trp Thr Asn Leu Met His Leu Asp Thr Trp  
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 Leu Thr Met Leu Asp Lys Asn Lys Phe Leu Tyr Ser Pro Ile Ala Asn  
 275 280 285  
 Asp Val Phe Lys Phe Trp Asp Tyr Asp Leu Val Asn Gly Gly Ala Glu  
 290 295 300  
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 340 345 350

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35 40 45

Asp Ala Gln Lys Glu His Asp Ala Phe Ala Gln Ala Leu Arg Asp Glu  
50 55 60

Gly Ile Glu Val Leu Tyr Leu Glu Thr Leu Ala Ala Glu Ser Leu Val  
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Thr Pro Glu Ile Arg Glu Ala Phe Ile Asp Glu Tyr Leu Ser Glu Ala  
85 90 95

Asn Ile Arg Gly Arg Ala Thr Lys Lys Ala Ile Arg Glu Leu Leu Met  
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 115 120 125  
 Gln Lys Ser Glu Leu Pro Glu Ile Pro Ala Ser Glu Lys Gly Leu Thr  
 130 135 140  
 Asp Leu Val Glu Ser Asn Tyr Pro Phe Ala Ile Asp Pro Met Pro Asn  
 145 150 155 160  
 Leu Tyr Phe Thr Arg Asp Pro Phe Ala Thr Ile Gly Thr Gly Val Ser  
 165 170 175  
 Leu Asn His Met Phe Ser Glu Thr Arg Asn Arg Glu Thr Leu Tyr Gly  
 180 185 190  
 Lys Tyr Ile Phe Thr His His Pro Ile Tyr Gly Gly Gly Lys Val Pro  
 195 200 205  
 Met Val Tyr Asp Arg Asn Glu Thr Thr Arg Ile Glu Gly Gly Asp Glu  
 210 215 220  
 Leu Val Leu Ser Lys Asp Val Leu Ala Val Gly Ile Ser Gln Arg Thr  
 225 230 235 240  
 Asp Ala Ala Ser Ile Glu Lys Leu Leu Val Asn Ile Phe Lys Gln Asn  
 245 250 255  
 Leu Gly Phe Lys Lys Val Leu Ala Phe Glu Phe Ala Asn Asn Arg Lys  
 260 265 270  
 Phe Met His Leu Asp Thr Val Phe Thr Met Val Asp Tyr Asp Lys Phe  
 275 280 285  
 Thr Ile His Pro Glu Ile Glu Gly Asp Leu Arg Val Tyr Ser Val Thr  
 290 295 300  
 Tyr Asp Asn Glu Glu Leu His Ile Val Glu Glu Lys Gly Asp Leu Ala  
 305 310 315 320  
 Glu Leu Leu Ala Ala Asn Leu Gly Val Glu Lys Val Asp Leu Ile Arg  
 325 330 335  
 Cys Gly Gly Asp Asn Leu Val Ala Ala Gly Arg Glu Gln Trp Asn Asp  
 340 345 350  
 Gly Ser Asn Thr Leu Thr Ile Ala Pro Gly Val Val Val Val Tyr Asn  
 355 360 365  
 Arg Asn Thr Ile Thr Asn Ala Ile Leu Glu Ser Lys Gly Leu Lys Leu  
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Asp Tyr Leu Glu Arg Leu Leu Phe Asp Asp Ile Pro Phe Leu Glu Asp  
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Ala Gln Lys Glu His Asp Ala Phe Ala Gln Ala Leu Arg Asp Glu Gly  
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Ile Glu Val Leu Tyr Leu Glu Gln Leu Ala Ala Glu Ser Leu Thr Ser  
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Pro Glu Ile Arg Asp Gln Phe Ile Glu Glu Tyr Leu Asp Glu Ala Asn  
 85 90 95

Ile Arg Asp Arg Gln Thr Lys Val Ala Ile Arg Glu Leu Leu His Gly  
 100 105 110

Ile Lys Asp Asn Gln Glu Leu Val Glu Lys Thr Met Ala Gly Ile Gln  
 115 120 125

Lys Val Glu Leu Pro Glu Ile Pro Asp Glu Ala Lys Asp Leu Thr Asp  
 130 135 140

Leu Val Glu Ser Glu Tyr Pro Phe Ala Ile Asp Pro Met Pro Asn Leu  
 145 150 155 160

Tyr Phe Thr Arg Asp Pro Phe Ala Thr Ile Gly Asn Ala Val Ser Leu  
 165 170 175

Asn His Met Phe Ala Asp Thr Arg Asn Arg Glu Thr Leu Tyr Gly Lys  
 180 185 190

Tyr Ile Phe Lys Tyr His Pro Ile Tyr Gly Gly Lys Val Asp Leu Val  
 195 200 205



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Tyr Asn Arg Glu Glu Asp Thr Arg Ile Glu Gly Gly Asp Glu Leu Val  
 210 215 220

Leu Ser Lys Asp Val Leu Ala Val Gly Ile Ser Gln Arg Thr Asp Ala  
 225 230 235 240

Ala Ser Ile Glu Lys Leu Leu Val Asn Ile Phe Lys Lys Asn Val Gly  
 245 250 255

Phe Lys Lys Val Leu Ala Phe Glu Phe Ala Asn Asn Arg Lys Phe Met  
 260 265 270

His Leu Asp Thr Val Phe Thr Met Val Asp Tyr Asp Lys Phe Thr Ile  
 275 280 285

His Pro Glu Ile Glu Gly Asp Leu His Val Tyr Ser Val Thr Tyr Glu  
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Asn Glu Lys Leu Lys Ile Val Glu Glu Lys Gly Asp Leu Ala Glu Leu  
 305 310 315 320

Leu Ala Gln Asn Leu Gly Val Glu Lys Val His Leu Ile Arg Cys Gly  
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 340 345 350

Asn Thr Leu Thr Ile Ala Pro Gly Val Val Val Val Tyr Asp Arg Asn  
 355 360 365

Thr Val Thr Asn Lys Ile Leu Glu Glu Tyr Gly Leu Arg Leu Ile Lys  
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 Leu Lys Val Ala Arg Gln Glu His Glu Val Phe Val Asn Ile Leu Lys  
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 Asp Asn Ser Val Glu Ile Glu Tyr Val Glu Asp Leu Val Ser Glu Val  
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 Leu Ala Ser Ser Val Ala Leu Lys Asn Lys Phe Ile Ser Gln Phe Ile  
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 Leu Glu Ala Glu Ile Lys Thr Asp Gly Val Ile Asn Ile Leu Lys Asp  
 100 105 110  
 Tyr Phe Ser Asn Leu Thr Val Asp Asn Met Val Ser Lys Met Ile Ser  
 115 120 125  
 Gly Val Ala Arg Glu Glu Leu Lys Asp Cys Glu Phe Ser Leu Asp Asp  
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 Trp Val Asn Gly Ser Ser Phe Val Ile Asp Pro Met Pro Asn Val Leu  
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 Lys Met Tyr Thr Lys Val Arg Arg Arg Glu Thr Ile Phe Ala Glu Tyr  
 180 185 190  
 Ile Phe Lys Tyr His Ser Ala Tyr Lys Glu Asn Val Pro Ile Trp Phe  
 195 200 205  
 Asn Arg Trp Glu Glu Thr Ser Leu Glu Gly Gly Asp Glu Phe Val Leu  
 210 215 220  
 Asn Lys Asp Leu Leu Val Ile Gly Ile Ser Glu Arg Thr Glu Ala Gly  
 225 230 235 240  
 Ser Val Glu Lys Leu Ala Ala Ser Leu Phe Lys Asn Lys Ala Pro Phe  
 245 250 255  
 Ser Thr Ile Leu Ala Phe Lys Ile Pro Lys Asn Arg Ala Tyr Met His  
 260 265 270  
 Leu Asp Thr Val Phe Thr Gln Ile Asp Tyr Ser Val Phe Thr Ser Phe  
 275 280 285  
 Thr Ser Asp Asp Met Tyr Phe Ser Ile Tyr Val Leu Thr Tyr Asn Ser  
 290 295 300

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Asn Ser Asn Lys Ile Asn Ile Lys Lys Glu Lys Ala Lys Leu Lys Asp  
305 310 315 320

Val Leu Ser Phe Tyr Leu Gly Arg Lys Ile Asp Ile Ile Lys Cys Ala  
325 330 335

Gly Gly Asp Leu Ile His Gly Ala Arg Glu Gln Trp Asn Asp Gly Ala  
340 345 350

Asn Val Leu Ala Ile Ala Pro Gly Glu Val Ile Ala Tyr Ser Arg Asn  
355 360 365

His Val Thr Asn Lys Leu Phe Glu Glu Asn Gly Ile Lys Val His Arg  
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Ile Pro Ser Ser Glu Leu Ser Arg Gly Arg Gly Gly Pro Arg Cys Met  
385 390 395 400

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<212> PRT  
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Thr Pro Phe Ile Met Lys Asn Phe Leu Phe Asp Asp Ile Pro Tyr Leu  
35 40 45

Glu Val Ala Arg Gln Glu His Glu Val Phe Ala Ser Ile Leu Lys Asn  
50 55 60

Asn Leu Val Glu Ile Glu Tyr Ile Glu Asp Leu Ile Ser Glu Val Leu  
65 70 75 80

Val Ser Ser Val Ala Leu Glu Asn Lys Phe Ile Ser Gln Phe Ile Leu  
85 90 95

Glu Ala Glu Ile Lys Thr Asp Phe Thr Ile Asn Leu Leu Lys Asp Tyr  
100 105 110

Phe Ser Ser Leu Thr Ile Asp Asn Met Ile Ser Lys Met Ile Ser Gly  
115 120 125

Val Val Thr Glu Glu Leu Lys Asn Tyr Thr Ser Ser Leu Asp Asp Leu  
Page 11

130

135

Val Asn Gly Ala Asn Leu Phe Ile Ile Asp Pro Met Pro Asn Val Leu  
145 150 155 160

Phe Thr Arg Asp Pro Phe Ala Ser Ile Gly Asn Gly Val Thr Ile Asn  
165 170 175

Lys Met Phe Thr Lys Val Arg Gln Arg Glu Thr Ile Phe Ala Glu Tyr  
180 185 190

Ile Phe Lys Tyr His Pro Val Tyr Lys Glu Asn Val Pro Ile Trp Leu  
195 200 205

Asn Arg Trp Glu Glu Ala Ser Leu Glu Gly Gly Asp Glu Leu Val Leu  
210 215 220

Asn Lys Gly Leu Leu Val Ile Gly Ile Ser Glu Arg Thr Glu Ala Lys  
225 230 235 240

Ser Val Glu Lys Leu Ala Ile Ser Leu Phe Lys Asn Lys Thr Ser Phe  
245 250 255

Asp Thr Ile Leu Ala Phe Gln Ile Pro Lys Asn Arg Ser Tyr Met His  
260 265 270

Leu Asp Thr Val Phe Thr Gln Ile Asp Tyr Ser Val Phe Thr Ser Phe  
275 280 285

Thr Ser Asp Asp Met Tyr Phe Ser Ile Tyr Val Leu Thr Tyr Asn Pro  
290 295 300

Ser Ser Ser Lys Ile His Ile Lys Lys Glu Lys Ala Arg Ile Lys Asp  
305 310 315 320

Val Leu Ser Phe Tyr Leu Gly Arg Lys Ile Asp Ile Ile Lys Cys Ala  
325 330 335

Gly Gly Asp Leu Ile His Gly Ala Arg Glu Gln Trp Asn Asp Gly Ala  
340 345 350

Asn Val Leu Ala Ile Ala Pro Gly Glu Ile Ile Ala Tyr Ser Arg Asn  
355 360 365

His Val Thr Asn Lys Leu Phe Glu Glu Asn Gly Ile Lys Val His Arg  
370 375 380

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 35 40 45  
 Glu Pro Ile Cys Pro Asp Glu Leu Arg Arg Asp His Glu Gly Phe Gln  
 50 55 60  
 Ala Val Leu Lys Glu Lys Gly Cys Arg Val Tyr Met Pro Tyr Asp Val  
 65 70 75 80  
 Leu Ser Glu Ala Ser Pro Ala Glu Arg Glu Val Leu Met Asp Gln Ala  
 85 90 95  
 Met Ala Ser Leu Lys Tyr Glu Leu His Ala Thr Gly Ala Arg Ile Thr  
 100 105 110  
 Pro Lys Met Lys Tyr Cys Val Ser Asp Glu Tyr Lys Arg Lys Val Leu  
 115 120 125  
 Ser Ala Leu Ser Thr Arg Asn Leu Val Asp Val Ile Leu Ser Glu Pro  
 130 135 140  
 Val Ile His Leu Ala Pro Gly Val Arg Asn Thr Ala Leu Val Thr Asn  
 145 150 155 160  
 Ser Val Glu Ile His Asp Ser Asn Asn Met Val Phe Met Arg Asp Gln  
 165 170 175  
 Gln Ile Thr Thr Arg Arg Gly Ile Val Met Gly Gln Phe Gln Ala Pro  
 180 185 190  
 Gln Arg Arg Arg Glu Gln Val Leu Ala Leu Ile Phe Trp Lys Arg Leu  
 195 200 205  
 Gly Ala Arg Val Val Gly Asp Cys Arg Glu Gly Gly Pro His Cys Met  
 210 215 220  
 Leu Glu Gly Gly Asp Phe Val Pro Val Ser Pro Gly Leu Ala Met Met  
 225 230 235 240

Gly Val Gly Leu Arg Ser Thr Tyr Val Gly Ala Gln Tyr Leu Met Ser  
 245 250 255  
 Lys Asp Leu Leu Gly Thr Arg Arg Phe Ala Val Val Lys Asp Cys Phe  
 260 265 270  
 Asp Gln His Gln Asp Arg Met His Leu Asp Cys Thr Phe Ser Val Leu  
 275 280 285  
 His Asp Lys Leu Val Val Leu Asp Asp Tyr Ile Cys Ser Gly Met Gly  
 290 295 300  
 Leu Arg Tyr Val Asp Glu Trp Ile Asp Val Gly Ala Asp Ala Val Lys  
 305 310 315 320  
 Lys Ala Lys Ser Ser Ala Val Thr Cys Gly Asn Tyr Val Leu Ala Lys  
 325 330 335  
 Ala Asn Val Glu Phe Gln Gln Trp Leu Ser Glu Asn Gly Tyr Thr Ile  
 340 345 350  
 Val Arg Ile Pro His Glu Tyr Gln Leu Ala Tyr Gly Cys Asn Asn Leu  
 355 360 365  
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 370 375 380  
 Phe Ile Lys Ala Asp Pro Ala Tyr Ile Ser Tyr Cys Lys Ser Asn Asn  
 385 390 395 400  
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 405 410 415  
 Arg Met Tyr Gly Ser Leu His Cys Ala Ser Gln Val Val Tyr Arg Thr  
 420 425 430  
 Pro Leu Ala Pro Ala Ala Val Lys Ala Cys Glu Gln Glu Gly Asp Gly  
 435 440 445  
 Ile Ala Ala Ile Tyr Glu Lys Asn Gly Glu Pro Val Asp Ala Ala Gly  
 450 455 460  
 Lys Lys Phe Asp Cys Val Ile Tyr Ile Pro Ser Ser Val Asp Asp Leu  
 465 470 475 480  
 Ile Asp Gly Leu Lys Ile Asn Leu Arg Asp Asp Ala Ala Pro Ser Arg  
 485 490 495  
 Glu Ile Ile Ala Asp Ala Tyr Gly Leu Tyr Gln Lys Leu Val Ser Glu  
 500 505 510

Gly Arg Val Pro Tyr Ile Thr Trp Arg Met Pro Ser Met Pro Val Val  
515 520 525

Ser Leu Lys Gly Ala Ala Lys Ala Gly Ser Leu Lys Ala Val Leu Asp  
530 535 540

Lys Ile Pro Gln Leu Thr Pro Phe Thr Pro Lys Ala Val Glu Gly Ala  
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Val Asp Ile Lys  
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<210> 11  
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<400> 11

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20 25 30

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35 40 45

Val Ala Arg Glu Glu His Asp Ala Phe Ala Gln Thr Leu Arg Glu Ala  
50 55 60

Gly Val Glu Val Leu Tyr Leu Glu Val Leu Ala Ala Glu Ala Ile Glu  
65 70 75 80

Thr Ser Asp Glu Val Lys Gln Gln Phe Ile Ser Glu Phe Ile Asp Glu  
85 90 95

Ala Gly Val Glu Ser Glu Arg Leu Lys Glu Ala Leu Ile Glu Tyr Phe  
100 105 110

Asn Ser Phe Ser Asp Asn Lys Ala Met Val Asp Lys Met Met Ala Gly  
115 120 125

Val Arg Lys Glu Glu Leu Lys Asp Tyr His Arg Glu Ser Leu Tyr Asp  
130 135 140

Gln Val Asn Asn Val Tyr Pro Phe Val Cys Asp Pro Met Pro Asn Leu  
145 150 155 160

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Tyr Phe Thr Arg Glu Pro Phe Ala Thr Ile Gly His Gly Ile Thr Leu  
165 170 175

Asn His Met Arg Thr Asp Thr Arg Asn Arg Glu Thr Ile Phe Ala Lys  
180 185 190

Tyr Ile Phe Arg His His Pro Arg Phe Glu Gly Lys Asp Ile Pro Phe  
195 200 205

Trp Phe Asn Arg Asn Asp Lys Thr Ser Leu Glu Gly Gly Asp Glu Leu  
210 215 220

Ile Leu Ser Lys Glu Ile Leu Ala Val Gly Ile Ser Gln Arg Thr Asp  
225 230 235 240

Ser Ala Ser Val Glu Lys Leu Ala Lys Lys Leu Leu Tyr Tyr Pro Asp  
245 250 255

Thr Ser Phe Lys Thr Val Leu Ala Phe Lys Ile Pro Val Ser Arg Ala  
260 265 270

Phe Met His Leu Asp Thr Val Phe Thr Gln Val Asp Tyr Asp Lys Phe  
275 280 285

Thr Val His Pro Gly Ile Val Gly Pro Leu Glu Val Tyr Ala Leu Thr  
290 295 300

Lys Asp Pro Glu Asn Asp Gly Gln Leu Leu Val Thr Glu Glu Val Asp  
305 310 315 320

Thr Leu Glu Asn Ile Leu Lys Lys Tyr Leu Asp Arg Asp Ile Lys Leu  
325 330 335

Ile Lys Cys Gly Gly Gly Asp Glu Ile Ile Ala Ala Arg Glu Gln Trp  
340 345 350

Asn Asp Gly Ser Asn Thr Leu Ala Ile Ala Pro Gly Glu Val Val Val  
355 360 365

Tyr Ser Arg Asn Tyr Val Thr Asn Glu Ile Leu Glu Lys Glu Gly Ile  
370 375 380

Lys Leu His Val Ile Pro Ser Ser Glu Leu Ser Arg Gly Arg Gly Gly  
385 390 395 400

Pro Arg Cys Met Ser Met Pro Leu Ile Arg Glu Asp Leu  
405 410

<210> 12  
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&lt;213&gt; Bacillus licheniformis

&lt;400&gt; 12

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 35 40 45  
 Ala Val Gln Lys Glu His Gln Lys Phe Ala Glu Thr Leu Lys Gln Gln  
 50 55 60  
 Gly Ala Glu Val Leu Tyr Leu Glu Lys Leu Thr Ala Glu Ala Leu Asp  
 65 70 75 80  
 Asp Ala Leu Val Arg Glu Gln Phe Ile Asp Glu Leu Leu Thr Glu Ser  
 85 90 95  
 Lys Ala Asp Ile Asn Gly Ala Tyr Asp Arg Leu Lys Glu Phe Leu Leu  
 100 105 110  
 Thr Phe Asp Ala Asp Ser Met Val Glu Gln Val Met Ser Gly Ile Arg  
 115 120 125  
 Lys Asn Glu Leu Glu Arg Glu Lys Lys Ser His Leu His Glu Leu Met  
 130 135 140  
 Glu Asp His Tyr Pro Phe Tyr Leu Asp Pro Met Pro Asn Leu Tyr Phe  
 145 150 155 160  
 Thr Arg Asp Pro Ala Ala Ala Ile Gly Ser Gly Leu Thr Ile Asn Lys  
 165 170 175  
 Met Lys Glu Pro Ala Arg Arg Arg Glu Ser Leu Phe Met Arg Tyr Ile  
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 Ile Asn His His Pro Arg Phe Lys Gly His Glu Ile Pro Val Trp Leu  
 195 200 205  
 Asp Arg Asp Phe Lys Phe Asn Ile Glu Gly Gly Asp Glu Leu Val Leu  
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Arg Gly Lys Thr Ala Asp Glu Ile His Thr Thr Glu Glu His Asn Leu  
 305 310 315 320

Pro Glu Val Leu Lys Arg Thr Leu Gly Leu Ser Asp Val Asn Leu Ile  
 325 330 335

Phe Cys Gly Gly Gly Asp Glu Ile Ala Ser Ala Arg Glu Gln Trp Asn  
 340 345 350

Asp Gly Ser Asn Thr Leu Ala Ile Ala Pro Gly Val Val Val Thr Tyr  
 355 360 365

Asp Arg Asn Tyr Ile Ser Asn Glu Cys Leu Arg Glu Gln Gly Ile Lys  
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Val Ile Glu Ile Pro Ser Gly Glu Leu Ser Arg Gly Arg Gly Gly Pro  
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Gln Ala Glu His Asp Ala Phe Ala Glu Leu Leu Arg Ser Lys Asp Ile  
 50 55 60

Glu Val Val Tyr Leu Glu Asp Leu Ala Ala Glu Ala Leu Ile Asn Glu  
 65 70 75 80

Glu Val Arg Arg Gln Phe Ile Asp Gln Phe Leu Glu Glu Ala Asn Ile  
 Page 18

Arg Ser Glu Ser Ala Lys Glu Lys Val Arg Glu Leu Met Leu Glu Ile  
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 Asp Asp Asn Glu Glu Leu Ile Gln Lys Ala Ile Ala Gly Ile Gln Lys  
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 Gln Glu Leu Pro Lys Tyr Glu Gln Glu Phe Leu Thr Asp Met Val Glu  
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 Ala Asp Tyr Pro Phe Ile Ile Asp Pro Met Pro Asn Leu Tyr Phe Thr  
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 Arg Asp Asn Phe Ala Thr Met Gly His Gly Ile Ser Leu Asn His Met  
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 Tyr Ser Val Thr Arg Gln Arg Glu Thr Ile Phe Gly Gln Tyr Ile Phe  
 180 185 190  
 Asp Tyr His Pro Arg Phe Ala Gly Lys Glu Val Pro Arg Val Tyr Asp  
 195 200 205  
 Arg Ser Glu Ser Thr Arg Ile Glu Gly Gly Asp Glu Leu Ile Leu Ser  
 210 215 220  
 Lys Glu Val Val Ala Ile Gly Ile Ser Gln Arg Thr Asp Ala Ala Ser  
 225 230 235 240  
 Ile Glu Lys Ile Ala Arg Asn Ile Phe Glu Gln Lys Leu Gly Phe Lys  
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 Asp Thr Val Phe Thr Met Ile Asp Tyr Asp Lys Phe Thr Ile His Pro  
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 Cys Lys Tyr Leu His Leu Asp Asn Val Gln Leu Ile Arg Cys Gly Ala  
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355

360

365

Ile Thr Asn Lys Ala Leu Glu Glu Ala Gly Val Lys Leu Asn Tyr Ile  
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Gln Lys Glu His Asp Gln Phe Ala Gln Thr Leu Arg Asp Asn Gly Val  
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Glu Val Leu Tyr Leu Glu Asn Leu Ala Ala Glu Ala Ile Asp Ala Gly  
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Asp Val Lys Glu Ala Phe Leu Asp Lys Met Leu Asn Glu Ser His Ile  
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Lys Ser Pro Gln Val Gln Ala Ala Leu Lys Asp Tyr Leu Ile Ser Met  
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Ala Thr Leu Asp Met Val Glu Lys Ile Met Ala Gly Val Arg Thr Asn  
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Asp Tyr Pro Phe Tyr Met Asp Pro Met Pro Asn Leu Tyr Phe Thr Arg  
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Asp Pro Ala Ala Ser Met Gly Asp Gly Leu Thr Ile Asn Lys Met Thr  
165 170 175

Phe Glu Ala Arg Gln Arg Glu Ser Met Phe Met Glu Val Ile Met Gln  
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His His Pro Arg Phe Ala Asn Gln Gly Ala Gln Val Trp Arg Asp Arg  
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 Asp His Ile Asp Arg Met Glu Gly Gly Asp Glu Leu Ile Leu Ser Asp  
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 Lys Val Leu Ala Ile Gly Ile Ser Gln Arg Thr Ser Ala Gln Ser Ile  
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 Asn Thr Leu Ala Ile Ala Pro Gly Val Val Val Thr Tyr Asp Arg Asn  
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 Tyr Val Ser Asn Glu Asn Leu Arg Gln Tyr Gly Ile Lys Val Ile Glu  
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 Val Pro Ser Ser Glu Leu Ser Arg Gly Arg Gly Gly Pro Arg Cys Met  
 385 390 395 400  
 Ser Met Pro Leu Val Arg Arg Lys Thr  
 405